EDUCATION SERIES #2

BUSH SAFETY IN MINERAL EXPLORATION

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MNDM • OBM • MDNM

Ministry of Northern Development and Mines

© 1991 Queen's Printer for Ontario
Printed in Ontario, Canada

Canadian Cataloguing in Publication Data
Umpherson, Don, 1953-
Bush safety in mineral exploration

(Education series, ISSN 1183-2436;2)
Issued also in French under title: Sécurité dans les bois pour les prospecteurs de minéraux
ISBN 0-7729-8288-0

1. Prospecting — Safety measures. 2. First aid in illness and injury. 3. Wilderness survival. I. Bennett, Douglas, 1949- . II. Webb, J.R. (James Richard), 1955- . III. Ontario. Ministry of Northern Development and Mines. IV. Title. V. Series: Education series (Sudbury, Ont); 2.

TN270.U46 1991 363.11-96221 C91-092517-8

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Parts of this publication may be quoted if credit is given.

It is recommended that reference to this report be made in the following form:

Umpherson, Don, Bennett, Douglas, and Webb, J.R., 1991. Bush Safety in Mineral Exploration; Ontario Ministry of Northern Development and Mines, Education Series No. 2,73p.

Stock No. 7192-E

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1.0 Introduction

As a mineral explorationist, you are going to be spending a substantial amount of time in the wilderness. Whether as a lone prospector or as part of a geological field crew, the time you spend in the outdoors might vary from a single afternoon to several months. This time should be spent productively, comfortably and safely. However, without knowledge of the risks you face in your working environment and without careful planning to reduce or eliminate those risks, the trip can result not only in discomfort and lack of accomplishment, but also in serious or even fatal injury to yourself or a co-worker.

The risk you face of getting injured partly depends on the amount of time you spend in the bush and the type of work you do. But it also depends to an even greater extent on how **safely** you perform your various tasks. Safe workers are constantly aware of the possibility of injury to themselves and their co-workers. Safe workers acquire the knowledge they need to prevent the accidents that result in injury.

Unfortunately, accidents will never be completely eliminated from the workplace. However, through co-operation among labour, management and government, steps are being taken to reduce the risk of accidents and improve the treatment of accidental injuries. By developing safe working procedures, providing health and safety training and enforcing health and safety legislation, many agencies are working toward eliminating hazards facing workers. These agencies include the Workplace Health and Safety Agency, the Mines Accident Prevention Association of Ontario and the Ministries of Labour, Environment, Natural Resources and Northern Development and Mines.

Extensive training in preventing accidents and illnesses is the cornerstone of the ongoing campaign to make work healthier and safer for employees. Such training is required in almost every occupation, including mineral exploration, where a wide variety of hazards may be encountered. Private companies and government agencies hold training seminars on a regular basis to upgrade their employees' knowledge of a variety of topics such as new equipment and procedures, health and safety regulations and first aid. This manual is intended to provide you with some of the knowledge you require to work safely in the bush. But it is no substitute for professional training. So be sure to take advantage of any training opportunities that are available to you.

2.0 Safety in the Field

2.1 Responsibility for Safety

Health and safety on the job is everyone's responsibility, from the Chief Executive Officer to the hourly-rated employee. These responsibilities are set out in general terms in Ontario's *Occupational Health and Safety Act* and in more detail in regulations made under the *Act* such as the *Regulations for Mines and Mining Plants*. Failure to follow these legal requirements could lead to charges of negligence and financial liability. The term "negligence" means the failure to take reasonable precautions to avoid injury to persons or damage to property. For example, workers who work without the proper personal protective equipment, or supervisors who allow workers to do so, are negligent. Cases of extreme negligence, resulting in serious injury or loss of life, could lead to criminal charges. Not providing a co-worker with necessary first aid could also lead to legal proceedings.

Employers

Employers have the primary responsibility for health and safety. In general, it is the role of employers and senior managers to establish policies on safety and training, hire competent supervisors to implement and enforce those policies and provide the resources, financial and otherwise, to do so. Specific responsibilities under the *Act* include the following:

- ensuring that the equipment, material and protective devices prescribed in the *Act* or *Regulations* are provided, maintained and used;
- ensuring that all prescribed measures and procedures are followed;
- providing information, instruction and competent supervision to workers to protect their health and safety; and
- taking every reasonable precaution for the protection of workers.

Day-to-day responsibility for health and safety rests mainly on the shoulders of supervisors and workers.

Supervisors

Most companies or agencies place much of the onus on their field crew supervisors to make sure crew members work safely as well as

productively. Supervisors are responsible for establishing safe work practices for the tasks performed and supervising workers to ensure that they follow these practices and do not take short cuts. They must also ensure that crew members are competent persons who have been trained in how to perform their jobs in a safe manner. Any additional training needs should be identified and provided by the supervisor. Crew members must be provided with the proper equipment, including personal protective equipment; and supervisors must ensure that this equipment is maintained and used. They are also required by law to advise workers of any potential or actual dangers to their health or safety of which the supervisor is aware.

In a wilderness situation, where crews are forced by their remoteness to be self-sufficient, supervisors have additional responsibilities. It is especially important that all vehicles, snowmobiles, aircraft and watercraft be fitted with emergency equipment and checked regularly to ensure they are in good operating condition. Field camps should be fully outfitted with safety and first aid equipment. Radio transceivers and emergency equipment should be checked regularly and the on-site crew should be fully trained in emergency first aid.

Supervisors should ensure that personnel are trained in safe operating procedures for various types of transportation, including bush-road driving, boating, snowmobiling and flying. They must also know the regulations for transporting hazardous materials.

Workers

The main responsibility of workers is to perform assigned tasks in a manner that is consistent with approved and safe practices, procedures and regulations: i.e. to follow the rules. This includes wearing or using personal protective equipment as directed.

However, if you are a worker, your responsibility goes beyond merely obeying orders. You are expected to work co-operatively with other members of the team and to use common sense and to be alert at all times. Regularly inspect the machinery and equipment you use and report any problems to your supervisor. Be constantly on the look out for potential hazards to yourself and your

co-workers. Such hazards, including the unsafe actions of co-workers, should be corrected and/or reported.

Whether you are an employer, a supervisor or a worker, remember that no one has more influence over your personal safety than yourself.

2.2 Personal Safety

Eyes

Wear safety glasses with side shields while sampling rocks, blasting, operating a chain saw, rock saw, plugger or fire pump or when slinging any overhead load. Goggles give even greater protection and are preferable for any work above eye level and when handling hazardous materials. Serious eye injuries from branches can occur while walking through the bush, so wear glasses at all times while traversing.

If you wear regular glasses, get safety lenses and removable side shields for them or wear protective equipment such as a full face shield over them. If you wear contacts, it is especially important to wear goggles or a face shield when handling corrosives or other hazardous liquids as they can get under the lens and do even more severe damage.

Ears

Regular exposure to noise levels above 85 decibels (dB) can result in permanent hearing loss. If you are standing three feet from someone and feel the need to shout, the noise level probably exceeds 85 dB. The louder the noise, the shorter the exposure time required to damage your hearing. Prime sources of potentially dangerous noise include chain or rock saws, pluggers, fire pumps, diamond drills, mining and quarrying equipment, aircraft and blasting operations.

However, protecting your hearing is not as simple as merely putting on a pair of earmuffs. Muffs and ear plugs must be properly fitted and maintained in order to be effective. Tests have shown that hearing protection equipment that has, under ideal conditions in the manufacturer's laboratory, a noise reduction rating of 25 dB, only reduces noise by about half that much in actual workplace settings. It is thus important that supervisors train workers in properly fitting and maintaining this equipment. They should also be aware of the actual noise levels of any machinery or processes which workers will be exposed to so that they can advise them on how to protect themselves from permanent hearing damage.

Head

Working in any situation where there might be falling or flying debris requires the wearing of a CSA approved hard hat. They must be worn around all drill sites, pits or trenches, and around mine sites. The hat should fit comfortably, without being too tight or so loose as to fall over the eyes when bending forward. Do not paint plastic hard hats or drill holes in the side of them as this weakens them and makes the CSA approval void.

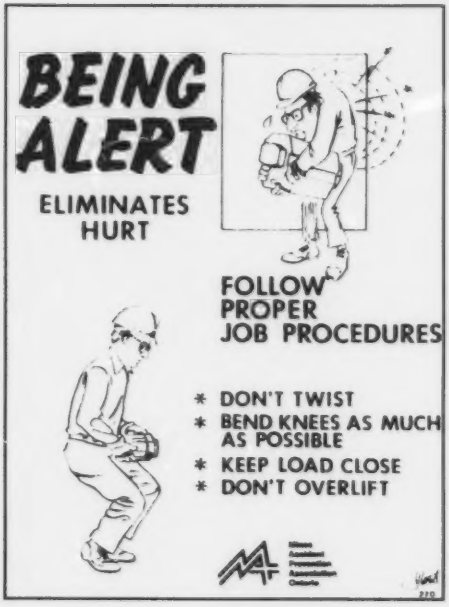
Hands

Gloves should be worn when performing heavy manual labour and insulated gloves worn as protection against the cold. There are many types of gloves available and it is important to match the glove to the hazard from which you need protection. Leather gloves offer good protection from cuts and scratches as well as short term protection from fire and heat. When handling corrosive materials, however, gloves made of nitrile, neoprene or butyl rubber are required. Do not wear gloves or rings when operating machinery as they may become entangled.

To protect yourself from dermatitis and other skin inflammations, keep your hands clean by washing them with the mildest cleansing agent that will do the job (such as plain water); and never use gasoline, turpentine or other solvents to remove grease.

Feet

Any long-distance hiking requires durable boots with non-slip soles and proper ankle support. CSA approved Level 1 safety boots (with a green triangle patch) should always be worn when handling heavy materials or using heavy objects to cut or hammer (e.g. axe, heavy sledge, chainsaw) or when subject to a potential puncture injury (e.g. construction site with nails). Heavily insulated waterproof boots (with pull-out wool or felt liners) should be worn in cold weather.



Back

Improper lifting techniques account for 30% of back injuries. When lifting any object, especially a heavy one, lift with your legs, not with your back, and avoid twisting. Try to keep your back straight when you lift, and "cradle" heavy objects close to your body when carrying them. Get assistance if there is any possibility you might strain yourself while doing the job alone.

Most back injuries, however, result from actions other than lifting and are the product of years of neglecting your back. To avoid back injury it is important to keep back muscles strong and flexible. An inexpensive *Back Care Exercise Program* is available from the Mines Accident Prevention Association of Ontario.

3.0 Trip Preparation

Careful planning is a key ingredient in a successful trip. Factors to be considered in preparing and outfitting yourself include your destination, the season, the method of transportation, the number of travellers and the duration of the trip. Checklists are a useful aid in planning.

Don't forget to let people know what your destination is, when you intend to reach it, when you intend to return and what your route will be. This makes things a lot easier in case someone has to look for you.

3.1 Physical Conditioning

Leading a sedentary lifestyle for any period of time usually results in less than peak physical conditioning, and trekking up and down hills while carrying a full pack under rugged conditions is physically demanding work. Before leaving, undergo a physical examination and/or physical training. If you plan to be away for any length of time, a dental check-up is also suggested.

3.2 Backpack

Whether it's for one afternoon or several weeks, there are certain items which no one should be without when entering the bush. Your backpack or pockets should contain:

- a compass, and topographic map or air photos. Try to find out anything you can about unfamiliar territory;
- a pocket knife (preferably an army-style survival knife);
- wooden matches in a sealed pill bottle or film canister to keep them dry, and a candle;
- insect repellent;
- a whistle and small mirror (it can reflect a signal that can be seen up to 30 km away). The mirror in a compass will do;
- a roll of electrical tape;
- some safety pins (in another pill bottle);

- a couple of large, orange garbage bags, which can be turned into a highly visible tarp with the help of the electrical tape, or used as emergency rainwear;
- a small first aid kit.

All these items should fit into a pocket of your backpack. If you are entering a remote area or are going to be away for more than a day or two, you should also include:

- a small flashlight;
- a small bottle of water decontamination tablets;
- about 6 metres (20 feet) of thin nylon cord;
- a small sharpening stone;
- extra clothes and a waterproof poncho;
- a nylon tarp;
- some bungy cords (they stretch easily and can be used to attach other items to your pack);
- additional food - high-energy foods like chocolate, granola bars, trail mix, raisins, dehydrated soups, bouillon cubes, salt;
- a large metal cup and pan (military mess kits can be fastened to the outside of your pack with the bungy cords);
- 12 metres (40 feet) of heavy-test fishing line, hooks and 6 metres (20 feet) of snare wire;
- a small axe.

If you are being dropped off by a helicopter, these additional survival items, plus a pup tent and sleeping bags, could be dropped at the pick-up point. This also ensures that you and the pilot agree on the pick-up location.

3.3 First Aid Kits

No matter how long you plan to stay, it is extremely important to include an emergency first aid kit. It should contain:

- a first aid manual;
- more than the necessary amount of any prescribed medication in case of a prolonged stay;

- several rolls of one-inch and two-inch wide gauze bandage;
- sterile gauze dressings, about three inches square, for larger cuts;
- adhesive tape, self-adhesive bandages and antiseptic;
- triangular bandages;
- aspirin or other painkillers (optional).

Wrap these items in a separate waterproof bag, seal it with tape and put it in a readily accessible part of your pack.

4.0 Transportation

In addition to foot and vehicle travel, transportation in remote areas is often by means of watercraft, aircraft, all-terrain vehicles (ATVs) and snowmobiles. Legislation such as the *Federal Aviation Act*, the *Small Vessels Act* and the *Motor Vehicles Act* regulates the operation of these vehicles. Operators of these vehicles obviously should be fully aware of all legal requirements and passengers should obey the operator's instructions.

4.1 Foot Travel

Cross-country traversing is a routine part of geological investigation and exploration. While it appears extremely simple and without danger, those traversing on foot should not be lulled into a false sense of security. Even on trails or in areas you may have travelled before, there may be unforeseen hazards. Stay alert.

Veterans at working and travelling in the bush tend to know what pace they can keep and the size of loads they can carry comfortably. Novices entering an area for the first time should rely on the expertise and knowledge of those who have travelled the area before.

Make sure your equipment is in good repair. Check the laces, soles, eyes and hooks on your boots. Carry the usual items found in a day-pack, including a first aid kit and an emergency survival kit.

General Travel Precautions

Whenever possible, travel in pairs. If there will be some distance between partners, each should be outfitted with a walkie-talkie. It is best to put an experienced worker with one who is less experienced; the less experienced member of the party will have a chance to learn more.

Other precautions include:

- travel the speed of the slowest party member;
- use extra caution when travelling alone. If you must travel alone, make sure there is someone who can come promptly to your aid if you do not return on schedule;

- inform others where you are going. Leave a map with the route drawn and the estimated time of departure and return;
- do not panic if you become lost or injured.

The supervisor who directs the traverse is responsible for:

- selecting competent workers;
- ensuring workers have bush safety training;
- ensuring necessary safety equipment, maps, air photos, compasses, first aid materials and survival kits are taken;
- ensuring trespass regulations are not broken during the traverse;
- planning the time of departure and estimated return from the traverse and ensuring it is not excessively long or physically demanding;
- informing workers of any anticipated hazards.

4.2 Traversing in Winter

When travelling in winter, it is best to dress in layers: it provides better insulation and enables you to peel off a layer if you get too hot. One wool layer, which provides warmth even when wet, and one nylon/polyester layer for windbreaking should be included. Most winterwear is of the "warmth without weight" type, which allows you to wear well insulated parkas without stumbling under the weight.

Since most heat loss occurs through the head, be sure to wear a toque or balaclava. Take sunglasses to prevent eye irritation from the sun's rays reflecting off the snow.

Lightweight snowmobile-style footwear, with rubber bottoms, leather uppers, good gripping soles and removable wool or felt inner liners, are best for walking. The liners may have to be dried out periodically due to dampness from perspiration. A spare pair of liners is helpful. Always take snowshoes.

When travelling through the forest, walking along game trails will save slogging through deep snow. But be sure they don't lead you off your intended path.

Ice Safety

When travelling on a frozen lake, beware of slushy areas and thin ice over up-welling springs. The latter will appear as dark, clear, round patches. If you can stay on clear ice, do so. Snow acts as an insulator and can prevent ice from freezing solid.

When crossing a frozen river or stream, avoid spots where a rock is protruding. There is usually an eddy where the water swirls around the rock and the ice will be thin.

When walking on unfamiliar ice, carry a pole. It can be used not only to test the ice before you, but as a support if you fall through. Be prepared to discard your pack in an instant.

If you do fall through and don't have a pole, extend your arms in front of you and kick your feet to the surface. Then, on your belly, wriggle your way out of the water in the same way that a seal does.

Figure 4.1

When you reach a place with solid footing, roll in powdery snow. It will absorb some of the moisture and have an insulating effect while a fire is being lit.

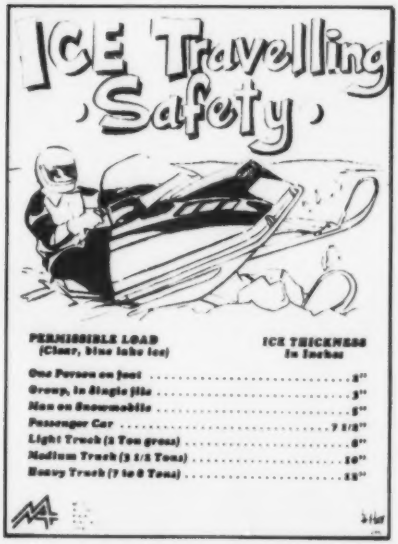
While traversing ice, snowshoes or skis will evenly distribute your weight over a larger area, making falling through the ice less likely. However, it is important to practise quickly removing your snowshoes in case you do break through the ice.

4.3 Snowmobiles

As fun as they are, it is important to remember that while on the job, snowmobiles are work horses, not toys. Each year, hundreds of persons are seriously injured or killed in snowmobiling accidents. As with any other vehicle, there are "rules of the road" that must be followed in order to avoid such accidents. They include **not** using your snowmobile for racing, chasing wildlife or any other "fun" activities while on the job.

When snowmobiles are to be used on a traverse, field crew supervisors should ensure that:

- all the machines are in good operating condition before setting out, and contain a tool kit, spare parts and emergency equipment;
- all drivers and passengers are wearing an approved helmet, a face mask and goggles;



- machines are used in pairs while on long traverses;
- new drivers are provided with operating and maintenance instructions;
- one person on each machine can troubleshoot minor problems and perform emergency repairs;
- all drivers are warned about potential hazards, especially travelling across ice; it must be tested first and never crossed during freeze up or break up.

Because snowmobiles are often used in some extremely adverse weather conditions, some additional equipment is essential on a long traverse. This includes extra fuel, a map, compass, snowshoes or skis, knife, candles, extra clothing, block and tackle, axe, flashlights with extra batteries, flares and a first aid kit. A spare drive belt, sparkplugs, gas line antifreeze and tools should also be taken.

Operators and passengers, where possible, should wear blaze orange clothing to be easily spotted and should carry a large space blanket for additional warmth in an emergency. Hypothermia is the greatest hazard encountered in snow vehicle travel. Everyone who uses a snowmobile should be made aware of the dangers of wind on exposed skin and learn the signs of hypothermia and its treatment.

4.4 All-Terrain Vehicles (ATVs)

Much of what has been said about snowmobiles also applies to ATVs. Cautious driving, protective equipment and being prepared for emergencies are equally important here. However, there are some unique differences apart from the weather conditions in which they operate.

All-Terrain Vehicles are designed and manufactured for off-road use only. It is illegal to operate these vehicles on public roads. Although there is a temptation to drive these vehicles through all kinds of topography, there are some special safety considerations:

- when going up, down or across a slope, always shift your weight towards the top of the slope;
- when turning, slow down to avoid overturning;
- when riding in shallow waters, slow down. Most machines can be run in a river or creek with a maximum depth of 14 inches;
- do not park on a slope with soft ground — the machine may overturn.

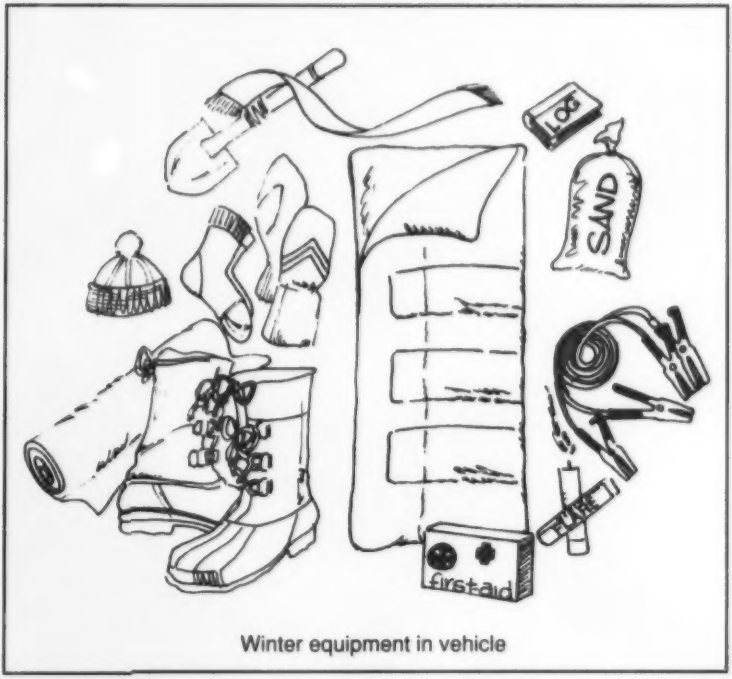
4.5 Trucks and Cars

Every operator of a vehicle used on rugged bush and gravel roads should be provided with training on the hazards of bush road driving.

When driving on gravel or bush roads:

- keep your sights high and wide and keep your eyes moving. Don't fall prey to the fixed stare;
- keep well back of other vehicles to ensure maximum visibility and reduce the chance of stone damage to your windshield, radiator or headlights;
- drive according to existing conditions, not the way you remember it. Bush roads can deteriorate rapidly due to washouts, floods, downed trees, ice, whiteouts, etc.;
- know your vehicle's and your own capabilities. Although a 1/2 ton truck is adequate for most conditions, you may have to resort to a 4-wheel drive, an ATV or even to walking;
- see and be seen. Reduce your speed, keep your headlights on and use the horn on blind corners or steep hill crests.

All field vehicles should be equipped with roof racks, mirrors, extra headlights, spare tires, a fire extinguisher, flares, extra wiper blades, a winch (optional), chains, an emergency first aid kit and a survival kit. In winter, the vehicle should contain booster cables, extra mitts, toques and sleeping bags, a shovel, sand bags, blankets and a candle. (See Figure 4.2)



Winter equipment in vehicle

Figure 4.2

Field supervisors should ensure that:

- annual safety checks are performed on all vehicles;
- regular maintenance and daily safety checks are done;
- the proper emergency equipment is present in each vehicle;
- heavy objects are transported in trailers maintained in safe condition;
- hazardous materials are transported according to regulations;
- standard field vehicles are not used as ambulances, explosive carriers or tow trucks unless they are specifically equipped to do so;

- loose items which could become dangerous projectiles in an accident are secured in the vehicle.

It is recommended that vehicle log books be kept up on a daily basis, noting any problems with such equipment as exhaust, tires, steering, headlights and windshield wipers.

4.6 Fixed-wing Aircraft

The pilot is the commander of the aircraft and his or her instructions must be followed.

The field crew supervisor should ensure that:

- aircraft are booked through, and the flight plans filed with, MNR Air Operations managers or the appropriate flight control centre;
- workers are instructed by the pilot as to safe practices while in or around the aircraft and in emergency situations. Written instructions regarding downed aircraft procedures may be distributed to frequent passengers;
- the aircraft is equipped with the proper emergency equipment, both in winter and summer. Emergency equipment should include a first aid kit, survival kit, axe, food and clothing and a copy of *Flight Precautions in Sparsely Settled Areas*.
- personnel use safety equipment during flights;
- base camps are aware of flight plans and schedules;
- unsafe aircraft equipment is reported to the contractor and the contract manager;
- planes are not overloaded or improperly loaded;
- pilots are not pressured into trying to land or take off from too small an area or fly in unsafe weather;
- dock staff are supervised while unloading or loading float and ski planes;
- hearing protection is worn in flights exceeding 30 minutes.

4.7 Helicopters

Helicopters are being used more and more for geological exploration, and with this increased use comes the greater possibility of mishap.

It is often necessary to quickly clear temporary helicopter landing sites. Field crew supervisors are responsible for the construction of temporary landing pads and for the safety of the crew working near the machine.

The supervisor should ensure that:

- crew members are instructed as to the safest way to approach or leave a helicopter while the blades are rotating;
- jumping from the "skids" is done only under extreme circumstances, and with instruction from the air crew;
- personnel are trained to unload and load equipment safely;
- personnel are instructed in safe procedures to be used when working in and around water or swamps;
- personal protective equipment such as safety glasses and hard hats are issued to personnel routinely working around the machine;
- there are no loose objects near the landing site that could be blown into the rotors;
- proper hand signals are used to give the pilot clearance for take-off after ensuring the skids are clear and personnel are a safe distance away.

Like the fixed-wing pilot, the pilot of the helicopter is the captain of the ship. His or her instructions must be followed at all times. The pilot is personally responsible for the safety of the flight and should never be unnecessarily distracted during the flight.

Passengers should:

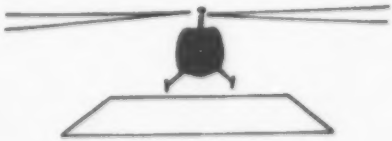
- be aware of the location of the survival kit, the axe, first aid kit and Emergency Locator Transmitter (ELT). In case of an accident, the ELT provides a homing signal to pinpoint the location which greatly reduces rescue time;

Approach or leave machine in a crouching manner *(for extra clearance from main rotor).*

Approach or leave slope side *(to avoid main rotor).*

Approach or leave in pilot's field of vision *(to avoid tail rotor).*

Do not touch bubble or any of the moving parts *(tail rotor linkage, etc.).*



Keep helispot clear of loose articles — water bags, groundsheets, empty cans, etc.

Keep cooking fires well clear of helispot.

Figure 4.3 a

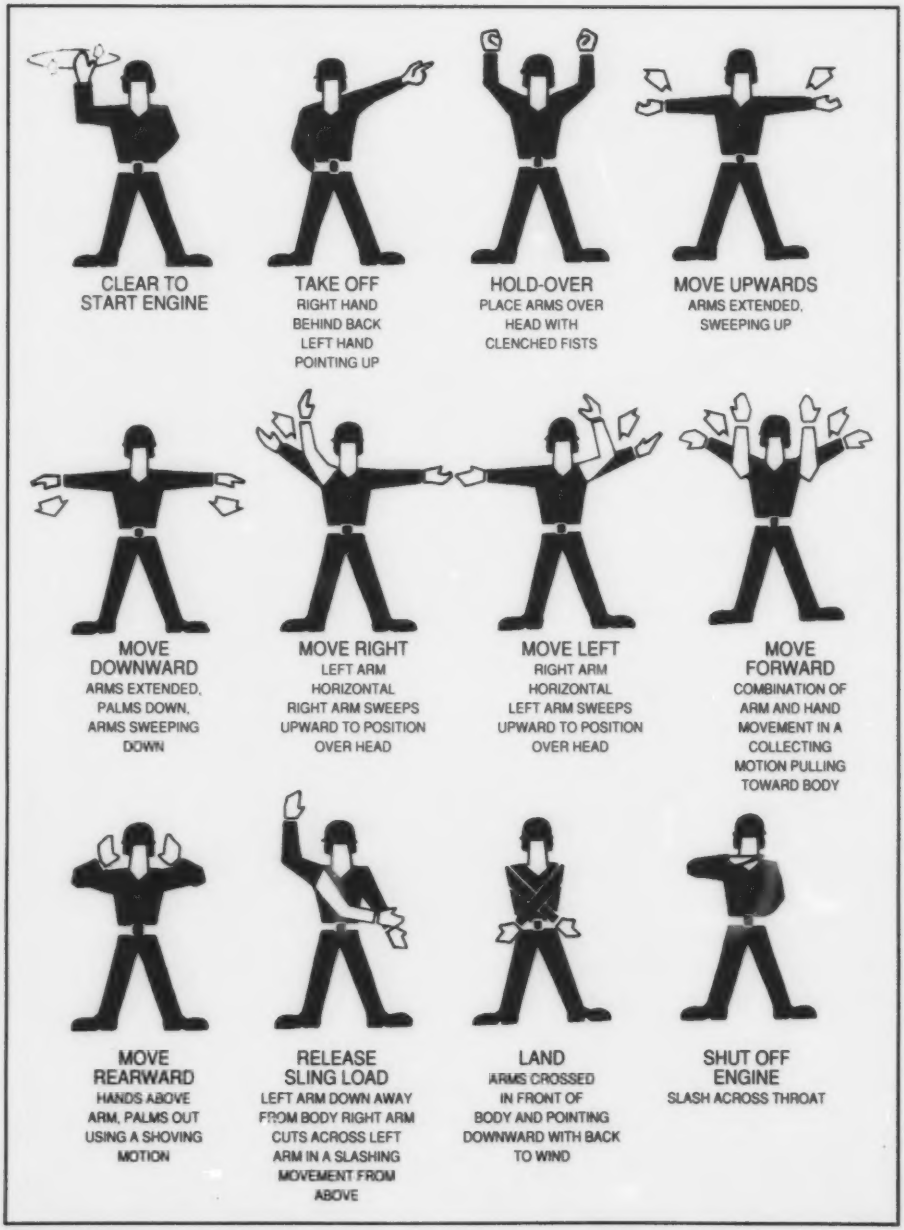

CLEAR TO START ENGINE
TAKE OFF
RIGHT HAND BEHIND BACK
LEFT HAND POINTING UP
HOLD-OVER
PLACE ARMS OVER HEAD WITH CLENCHED FISTS
MOVE UPWARDS
ARMS EXTENDED, SWEEPING UP
MOVE DOWNWARD
ARMS EXTENDED, PALMS DOWN, ARMS SWEEPING DOWN
MOVE RIGHT
LEFT ARM HORIZONTAL
RIGHT ARM SWEEPS UPWARD TO POSITION OVER HEAD
MOVE LEFT
RIGHT ARM HORIZONTAL
LEFT ARM SWEEPS UPWARD TO POSITION OVER HEAD
MOVE FORWARD
COMBINATION OF ARM AND HAND MOVEMENT IN A COLLECTING MOTION PULLING TOWARD BODY
MOVE REARWARD
HANDS ABOVE ARM, PALMS OUT USING A SHOVING MOTION
RELEASE SLING LOAD
LEFT ARM DOWN AWAY FROM BODY RIGHT ARM CUTS ACROSS LEFT ARM IN A SLASHING MOVEMENT FROM ABOVE
LAND
ARMS CROSSED IN FRONT OF BODY AND POINTING DOWNWARD WITH BACK TO WIND
SHUT OFF ENGINE
SLASH ACROSS THROAT

Figure 4.3 b

- carry all tools, skis and other long objects in a horizontal, rather than vertical fashion while boarding to prevent possible contact with the rotor blade;
- never throw or drop objects while the rotors are turning;
- hold onto their hard hats while approaching the machine if the hat isn't secured by a chin strap;
- approach and leave the machine in a crouched position, always in the pilot's field of vision, never toward the rear of the helicopter;
- never place objects in the chin bubble or in any other way damage or scratch the windows or body of the helicopter. This could reduce the pilot's visibility.

4.8 Boats and Canoes

When using any watercraft:

- each individual should wear a CSA approved lifejacket or personal flotation device that is suitable for their body weight and the conditions;
- each craft should have two paddles or oars and oarlocks, an anchor, rope, whistle or horn and bailing bucket and all other equipment in accord with all provincial and federal regulations.

The supervisor should see that a suitable tool kit is provided for larger boats and a spare motor is carried on large water bodies. They should ensure that all employees have read the Canadian *Safe Boating Guide* and do not boat in inclement weather. All operators on an expedition should make the supervisor aware of their traverse plans.

Operators of larger boats on large bodies of water should take a "Power Squadron" course.

When the distance to be traversed is not too great and intermittent bodies of water have to be crossed, the canoe is the simplest means of travel. If the operators think it is necessary, a small electric or gas-powered motor may be attached to the canoe for speed and convenience.

In loading the canoe, keep the weight centered and low by placing the heaviest articles on the bottom and the lighter things on top. The load should be arranged so it will not shift when the canoe rocks and so that passengers won't become entangled in the event of capsizing.

Equipment carried should include the usual life jackets and bailing bucket and paddles. Where possible, an extra paddle should be carried in case one breaks or is lost overboard. Another useful piece of equipment to take canoeing is a small bow-saw, which fits under the seat and can be used to saw trees which have fallen across portages.

Equipment should be attached to the canoe in case of an upset. Should the craft upset some distance from shore, remain with the canoe.

During lake travel, it is advisable to stay as close to the shore as possible.

5.0 Setting up Camp

Good camp management combines safety, a concern for the environment and common sense. Before setting up camp, either as an individual or as a member of a team, check with the Ministries of Health (MOH), Natural Resources (MNR) and Environment (MOE) for regulations governing food preparation, the location of latrines, garbage bins, the lighting of fires and other legal requirements. In Northern Ontario, open fires may be restricted or prohibited in times of high fire potential. Small propane stoves are the best alternative.

The MNR recommends that a semi-permanent camp (one in place for 30 days or longer) have a shelter, stone fireplace and a pit latrine located 60 metres from any shoreline and downstream from the water supply. Each day, lime, ashes or earth should be added to the latrine.

All garbage must be removed from the campsite to a certified landfill site. In the meantime, to reduce the volume and avoid attracting bears and other nuisance animals, flatten all cans, burn all paper goods, and keep the garbage in sealed containers.

The field supervisor is responsible for ensuring that:

- campsites are located safely away from any potential hazards;
- flammable, hazardous materials such as propane are stored safely and fire extinguishers are located in every camp;
- open fires, when permitted, are kept small, are located in a safe site, and are thoroughly doused;
- appropriate first aid equipment is available at all times;
- food and water are stored and prepared properly;
- latrines conform to Public Health Act standards.

5.1 Camp Location

You'll naturally want the camp to remain high and dry during the spring run-off and during periods when the water rises quickly. The camp should also be located:

- in an open area close to safe drinking water;
- away from potential landslides, rockfalls or windfalls;
- away from tall and/or dead trees which could fall or drop branches in wind storms.

If your camp is near a dump, you might have a problem with bears and other nuisance animals. Whenever possible, it's a good idea to check with those who have used the campsite previously to see if there are any particular problems associated with the location or layout.

5.2 Layout

In optimum conditions, tents should be placed a sufficient distance apart to prevent any fire spreading between tents. The kitchen area should also be well separated from the sleeping area (about 50 m) due to the increased fire hazard it represents and its attractiveness to nocturnal nuisance animals.

All flammable liquids or hazardous substances should be stored in CSA-approved containers far enough from the camp to avoid a potential fire. Seal the containers tightly to prevent animals from opening them and clearly mark the barrels, following the relevant regulations.

Ensure that any helipad is constructed well away from the tents or any source of loose materials such as brush piles or clothes lines.

5.3 Fire Hazards

One of the first items to be addressed when considering open fires is fire regulations. Check with the MNR about burning permits, especially during the summer months.

Be on the lookout for potential causes of a forest fire, such as a bush fire, a fire from wood or propane stoves and lanterns, careless smoking or signal flares. The camp supervisor should ensure that fire extinguishers are on hand and that there is an evacuation plan in case of a major fire.

Fire regulations prohibit smoking while travelling in the woods. Any cigarette should be smoked while sitting in a safe location and butted out either by grinding it into mineral soil, putting it in water or butting it against a rock.

No open fire should be left unattended. When you are sure the fire is out, add a few more buckets of water just to be safe. When temporarily leaving camp turn off all non-essential propane tanks.

5.4 Lightning

The first thing to do when a lightning storm approaches the camp is disconnect the radio antennas, move them away from the radio, and ground them. Unless you do this, if the antenna is struck by lightning, the charge will travel through the wire into the radio, damaging it and possibly setting the room on fire.

If you're outside during a storm, avoid standing under tall trees or in open spaces, particularly on high ground. Seek out the shelter of a vehicle if there is one nearby; but first check that no live wires have fallen on it. Get out of the water if you're swimming or boating.

If anyone is hit by lightning and suffers respiratory failure, artificial respiration must be provided immediately (see page 55).

5.5 Nuisance Animals

With greater numbers of individuals travelling in the bush, and more dump sites, bears are quickly learning to capitalize on the human presence. Reduce the possibility of unwanted visitors with proper camp layout and garbage disposal.

If bears or raccoons are wreaking havoc with your campsite, first notify the MNR. They may want to live-trap the animal(s).

However, you should immediately destroy any animal you suspect of being rabid. Do not touch the animal. Using thick leather gloves, seal the animal in a heavy duty plastic bag or suitable plastic container. Do not touch the outside of the gloves after handling the animal and seal them in a container as well. Attach a note with the location, date and the name of a contact person and call your local

Agriculture Canada district office. Their Health of Animals Division will pick up the corpse to have it tested. If you are in a remote location, freeze the animal if possible. Thoroughly wash your hands with soap and warm water and sterilize them with rubbing alcohol, even though you wore gloves when handling the animal.

5.6 Communications

Dependable communications are absolutely essential in the event of a severe storm, an accident or a member of the crew becoming lost or sick. Not only should there be communication between camps, but between camps and aircraft.

It's also a good idea to establish radio contact with the local MNR district office and fire centre, and possibly the Ontario Provincial Police or others using radios in the area. Know where the nearest medevac dispatch station is in case of serious injury.

In Ontario, any Provincial Police station can be reached in case of emergency by phoning Zenith 50000.

6.0 Camp Equipment

Every camp should contain the equipment that is necessary to work efficiently in the field and to relax in comfort while in camp. However, your trip will be neither efficient nor comfortable if this equipment is not used safely.

6.1 Equipment Safety

See also Section 3.2 "Personal Safety"

Axes

There's an old maxim that there is no cut worse than that from a dull axe. Dull axes tend to glance off a log, and can end up in your shin. Keep an axe file handy and sharpen your axe at least twice a day if it is in constant use.

When the axe is not in use, keep the sheath on it. It not only protects the blade, but anyone who inadvertently stumbles into it. If you are traversing and want to put an axe in your pack, wrap it in a magazine if you don't have a sheath.

When carrying an unsheathed axe, hold it by the handle close to the head with the blade pointing away from you. Never carry an unsheathed axe over your shoulder.

If you are felling a tree for the first time, have someone with experience in the proper techniques train you. Before you begin chopping, check that the area is clear and that no branches or other objects will hinder your swing. Be sure you have a clear path of retreat. Do not fell trees when the wind is strong enough to make them sway. Wear safety boots and chop methodically and deliberately. Let the axe do the work for you.

Rock Hammers and Chisels

Always wear eye protection while chipping a rock sample as eye injuries can be caused by flying slivers. As with the axe, make sure your swing isn't impeded by any foliage. Use caution when carrying the rock hammer as some individuals have been injured from falling on them.

Chainsaws

Each year, the improper use of chainsaws results in serious and often disabling injuries. It is essential that all workers authorized to use chainsaws be thoroughly trained in their safe handling. Even if you have used chainsaws before, read the instruction manual for the particular model you will be operating.

Wear safety boots, leather "chaps" above and below the knee, cut-resistant gloves, a hard hat and eye and hearing protection.

Ensure that anyone felling a tree is trained in the proper way to do it. (See Figures 6.1 and 6.2.) Before cutting, clear the area and path of retreat of any obstructions.

Use the saw file regularly to keep cutting cleanly rather than gnawing at the tree. A sharp blade is less likely to become imbedded in the tree or to "kick-back".

A saw is said to "kick-back" when the blade bucks out of the cut. It is the major cause of the most severe injuries. (See Figure 6.3.) All chainsaws should be fitted with a chain brake which immediately stops the chain if the saw bucks up. To avoid kick-back, cut from a comfortable and safe position to maintain full control over the saw. Never straddle the saw while cutting and do not use the tip of the blade for cutting.

Other guidelines to help you work safely with chainsaws are:

- ensure that all parts are tight and the chain is properly tensioned;
- adjust the idle so that when your finger leaves the trigger, the blade stops;
- do not use a chainsaw for cutting brush or stripping bark;
- do not walk with the saw running. Carry it with the blade pointed to the rear;
- start the saw on the ground or on a stump, not on your knee;
- do not smoke while refuelling and do not refuel a hot machine;
- always keep a first aid kit nearby.

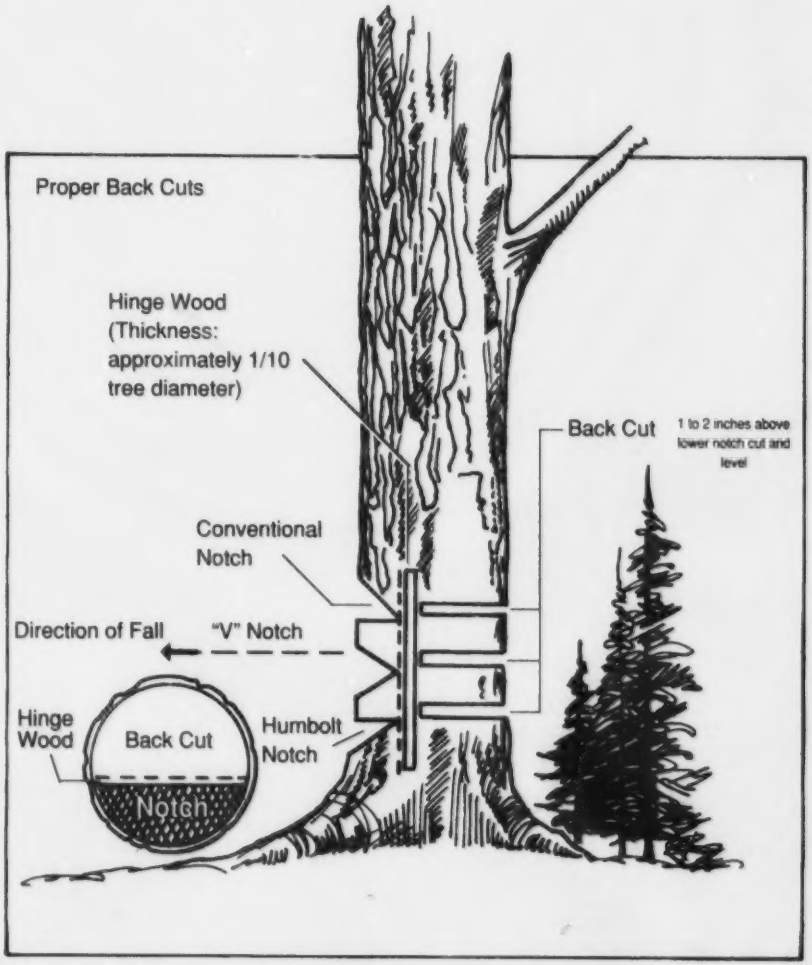

Proper Back Cuts
Hinge Wood
(Thickness:
approximately 1/10
tree diameter)
Back Cut
1 to 2 inches above
lower notch cut and
level
Conventional
Notch
Direction of Fall
"V" Notch
Hinge
Wood
Back Cut
Humbolt
Notch
Notch

Figure 6.1

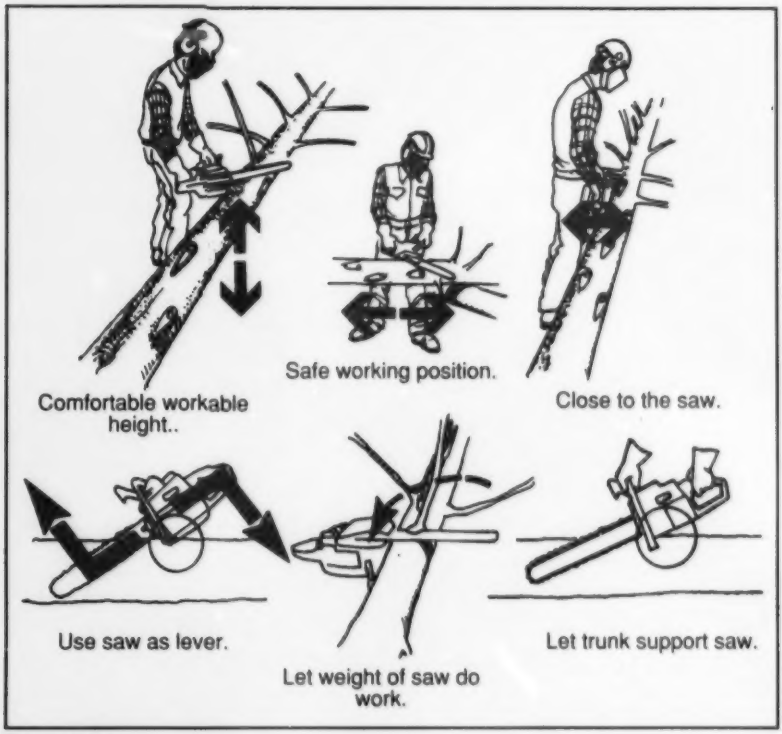

Comfortable workable height..
Safe working position.
Close to the saw.
Use saw as lever.
Let weight of saw do work.
Let trunk support saw.

Figure 6.2

Most Dangerous Kickback Zone!

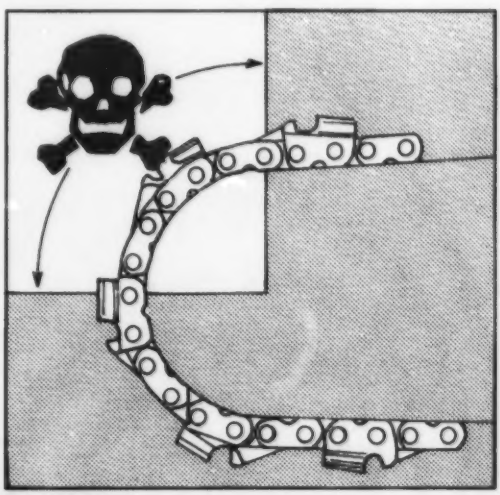


Figure 6.3

6.2 Lighting and Heating

Lanterns

Propane or battery-powered lanterns are recommended. Lanterns which run on flammable liquid may get knocked over, which can result in a fire which spreads rapidly. It is recommended that lanterns be hung from the ceiling rather than left on a table where they are more easily dislodged.

Other precautions when using lanterns include the following:

- light the lantern outside;
- keep burning lanterns away from fuel drums, cans or tanks that contain or have contained flammable liquids;
- be careful taking down a hanging lantern as the handle may be very hot;
- let a lantern that has run dry cool off before opening and refuelling it.

Stove Heating in Tents

Make sure the walls nearest the stove have a heat resistant barrier, or use aluminum foil which will also serve to reflect the heat around the tent.

If you're supporting the outside chimney with a pole, place a flattened tin can between the chimney and pole. Brace and wire the pipes until they are solid and use a heat resistant spark arrestor on oil and wood stoves.

7.0 Safety around Hazardous Sites

Every industry has its share of hazards, and the mineral exploration and development industry, by virtue of the fact that the bush is usually the workplace, is certainly no exception. But apart from the bush, there are other working environments that may be encountered by mineral explorationists that deserve special attention.

7.1 Hazards at Advanced Exploration Sites

When it is necessary to prove the extent of an ore body in a promising location, further exploration often involves blasting, trenching, drilling and/or bringing in heavy equipment to remove the overburden. Each of these activities presents hazards.

Explosives

Only employees who have had the proper training and know the relevant regulations for handling explosives should be allowed to use or transport the materials. Certification, magazine permits and proper handling regulations must be met before the use of explosives is considered.

Trenches

Trenches deeper than 1.2 metres (4 feet) must have the sides cut back to a 45 degree angle or be shored up with a support system, as specified in the Ministry of Labour's Construction Safety Regulations.

Heavy Equipment

The operator of large heavy equipment may have reduced visibility. It is therefore important that you do not approach such equipment unless you are sure that the operator is aware of your location and movements at all times.

Diamond Drill Sites

Diamond drill sites also have their own unique hazards. Those working as members of a diamond drill crew require as much training as miners. If you will be spending much time around diamond drill sites, consult the Canadian Diamond Drilling Association's *Safe Work Methods Handbook*. Others who may

occasionally visit a diamond drill site should observe the following precautions:

- do not handle equipment or machinery for which you have not been trained;
- avoid loose clothing which could become caught in the drill or machinery;
- wear hearing protection and any other personal protective equipment as directed by the crew supervisor;
- clean any drill core before licking the sample. Accidental toxic reactions may result from harmful chemicals left from drilling fluids;
- always wear a hard hat to prevent injury from falling debris from the upper deck or drill mast.

7.2 Hazards in Active Mines

Active mines are no longer the dangerous places they were in years gone by.

Nevertheless, they are unique working environments that deserve respect. Some of the main dangers are open holes, falls of ground, heavy equipment operating in confined spaces and the possibility of encountering oxygen-deficient atmosphere. Any of these can quickly kill with little warning.

Technological advances, improved safety programs and better regulations and operating procedures have reduced the risk posed by many of these hazards.

However, one of the main reasons that mines are safer today is that the people who work in them are much better trained in how to do so safely. It is therefore essential that you be accompanied by experienced mine personnel whenever you are underground or in a mine plant and that you follow their direction regarding what personal protective equipment to wear and so on.

7.3 Abandoned Mine Sites

Abandoned mine sites can be extremely dangerous places. That's why the Regulations for Mines and Mining Plants require that special precautions be taken to prevent entry. When abandoning a surface mine, steps must be taken to prevent access whenever there are hazards beyond the normal topographical features of the area and any time there is a danger of falling. Entrances to abandoned underground mines must be capped with reinforced concrete or filled and kept filled with material that will prevent entry. In the event that you come across an abandoned mine site where these precautions have either not been taken or have failed, **do not enter under any circumstances** and report your discovery to the Ministry of Northern Development and Mines as soon as possible.

8.0 Survival

8.1 Lost and Found

Being lost can be uncomfortable, frustrating, embarrassing and downright scary. Your state of mind will ultimately determine how well you cope. The biggest danger you face is getting caught in the grip of "bush panic" and wildly crashing through the bush in all directions, using up precious energy which you will need later. If you feel this coming on, sit down immediately, talk yourself down and stay put. Just remember, the odds are stacked in your favour, especially if you have followed the advice in the chapter on "Trip Preparation" and included an emergency kit in your backpack.

As long as you can improvise some shelter from the elements, there's no rush; you can live for 30 days without food and three days without water. So conserve your energy and stay calm. Sit down and orient yourself by using your map and compass. Look around for a familiar landmark. Estimate the amount of sunlight left. If daylight is fading, use what's left to set up camp. Get a fire going. Not only can it be used for cooking, but for warmth, a natural mosquito deterrent and a signal. Have a hot drink, a bite to eat and get some sleep.

8.2 Bush Navigation

If it is an easily manageable traverse back to camp, and if there is plenty of daylight left, and if weather conditions are moderate, and **if you are 100% certain of the direction**, then and only then should you attempt to walk out.

No one should enter the woods on any kind of excursion without some idea of orienteering by map and compass. Compasses may differ slightly, but the principle is always the same - the compass needle points north. Simply line up the tip of the needle with the 'N' on the compass and you can go any direction you wish.

Avoid having iron near the compass when sighting (belt buckle, magnet, etc.).

Say, for example, you want to reach a distant tall tree that you picked as your landmark. Line up the needle with 'N'. The landmark is at 135 degrees. Even if you lose sight of that landmark,

it will still always be 135 degrees of north. When you reach the landmark, select another one. Check the degrees and continue. (See Figure 8.1.)

Figure 8.1

If you are in an area of iron formation, or your compass is broken or missing, your watch can be used as a compass. Point the hour hand directly at the sun. Exactly half way between the hour hand and 12 will be due south. (See Figure 8.2.) This works for Standard Time - if it is Daylight Saving Time, remember to deduct an hour from the position of the hour hand.

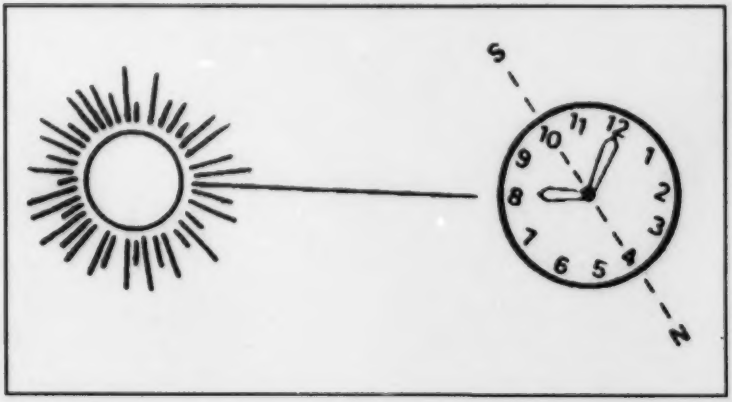


Figure 8.2

When navigating, keep alert and look for distinguishing landmarks and commit them to memory. Using your eyes and instincts - along with your map and compass - is the surest way of moving in a straight line and reaching your destination. Remember, veteran woodsmen say they get lost every day - it's the compass that gets them found.

8.3 The Search

If you are even the slightest bit uncertain of the direction back to camp, your best course is to wait to be found and to do what you can to assist the searchers.

For a typical geological traverse, if you're not back before dusk your supervisor will become concerned, especially if the weather conditions are poor. By the following morning a local float plane or helicopter base will be contacted to see if there is anyone who is in

your immediate area and a search will be organized as soon as possible. As the search continues, it will include your own crew members, the MNR, Ontario Provincial Police and, if necessary, the armed forces. There won't be any lack of manpower out looking for you.

If for any reason you are unable to show up at a pre-arranged pick-up spot, do not retrace your steps. The searchers will be retracing your route, either by air or on the ground, looking for signals. If you are not on your intended route, and are in dense bush, make your way to a conspicuous point, such as a ridge, lake or meadow, and prepare your smoke signal or flags.

If you have reached the correct pick-up point, but your transportation does not arrive, do not move. The aircraft or boat has probably suffered a breakdown. Your supervisor knows where you are, and everything possible is being done to bring you in.

If you are involved in a plane or helicopter crash, follow the pilot's orders. The pilot will have filed a flight plan with both the MNR and your supervisor, so other pilots will fly the same route in searching. The aircraft will also be equipped with flares and emergency equipment so stay near the downed craft. You can also use pieces of rubber, insulation and plane fuel to produce thick, black smoke for a signal fire.

Assisting the Search

There are a wide variety of effective distress signals. The age-old signal of smoke by day, fire by night is still one of the most effective. Build three fires about 30 metres apart in a triangular fashion (linear if along a riverbank or ravine) and be prepared to light them the moment you hear an aircraft. (See Figure 8.3.)

Three of anything is the universally-accepted code for persons in distress. Sound signals could include three shots from a firearm about 15 seconds apart or three blasts on a police-style whistle.

The third type of signal is the International Ground to Air Signal. Using any available materials, arrange an "SOS" signal which will be apparent to anyone overhead. You can trample it in the snow,

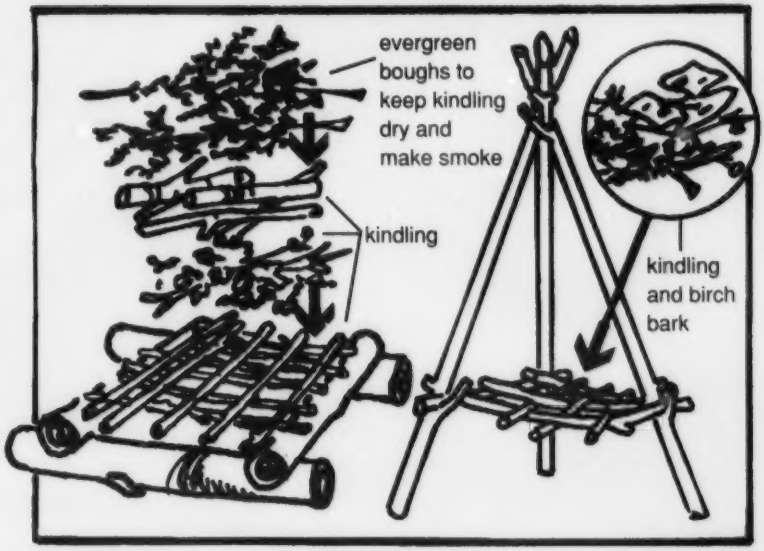


Figure 8.3

stomp down the grass in a meadow or set pieces of material or clothing in a visible spot. You can also cut brush and stand it on end. The most important thing to remember is that it should look out of place to catch a pilot's eye.

Other ground to air signals include "Proceed In This Direction", "Require Medical Attention", "Yes", "No", and "Require Assistance". (See Figure 8.4.)

One of the most simple yet effective means of signalling is with the use of a hand-held mirror. Upon spotting an aircraft, stand so the sun hits the full surface of the mirror. Straighten your arm and form a "V" with two fingers. Cast the reflection of the mirror through the "V" aimed toward the aircraft. It can be seen for miles. (See Figure 8.5.)

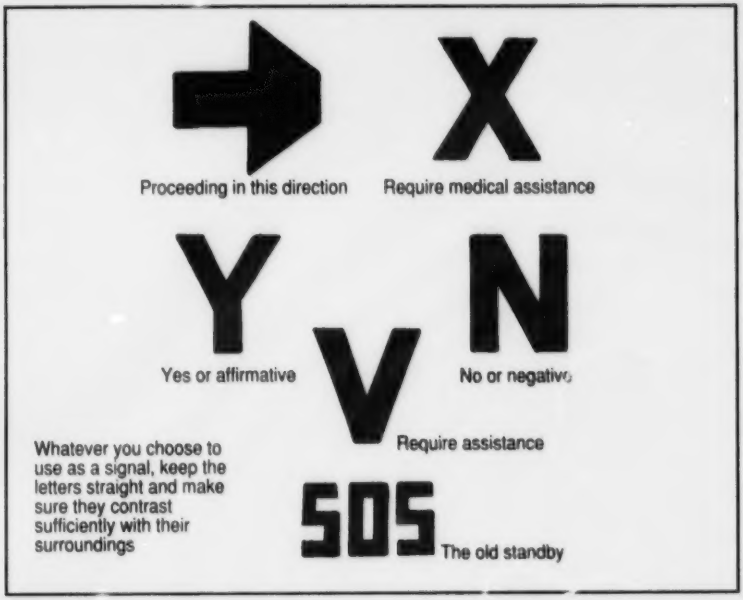


Figure 8.4

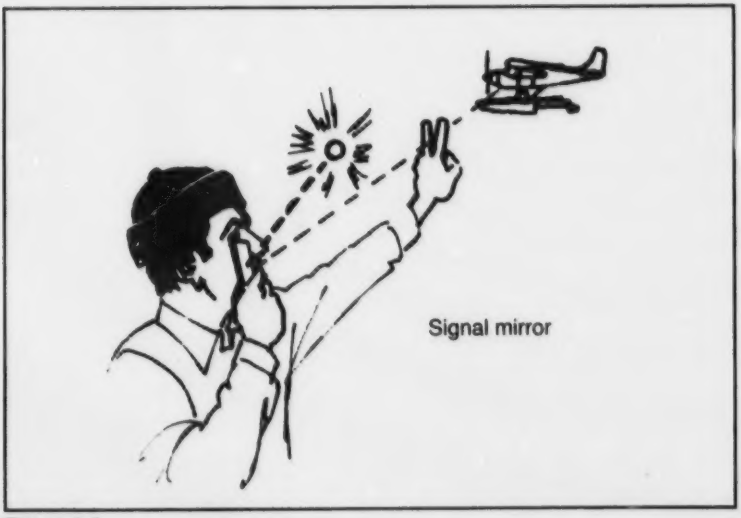


Figure 8.5

8.4 Bush Survival

As has already been discussed, the major enemy of survival is panic. It is essential that you: remain calm; assess your resources, both those you brought in your pack and those provided by nature; carefully form a plan; and methodically stick to it.

Each activity in your plan should be assessed according to whether it either conserves and/or adds to your energy, or uses it up. For example, the energy you use to build a shelter to protect yourself from the elements and keep warm is usually energy well spent because it has long-term value. The energy you spend wandering the woods in search of food may be more than the energy to be gained from any food found.

In general, your priorities should be in the following order: attending to any injuries you may have; seeking or constructing shelter; conserving and creating warmth (in cool or wet weather); finding water; resting to conserve your energy; and finding food.

Building a Shelter

Keeping warm and dry is not only necessary, but provides the comfort necessary to keep up your morale. It can be made with the equipment provided by nature - boughs, stumps and trees - or from the materials you are packing. Try not to use up too much energy building it, and situate it near water if possible. A good campsite requires good drainage, so build it on high ground. This will also enable you to scout the area better and make yourself more visible to those searching for you. The more open the area, the more sunlight you will have and any breeze will help to keep insects away.

A useful item in any emergency kit is a couple of large, orange garbage bags which can be easily fashioned into highly visible waterproof tarps or worn as rain gear.

In any of the following shelters, be sure to insulate yourself from the ground below as well as from the elements above.

Fallen-tree Shelter

The under-the-log shelter is elementary. Find a log with a small pit under it. Enlarge the pit and cover the log with boughs. Keep the living area small.

Lean-to

This is a pole shelter covered with boughs, rain gear or plastic. Find two trees about 3 metres apart and lash a pole to them 1 or 2 metres off the ground. Lean a series of vertical poles against your horizontal pole. Then heap spruce or other coniferous tree branches over the poles until you have a solid overhang. (See Figure 8.6.)

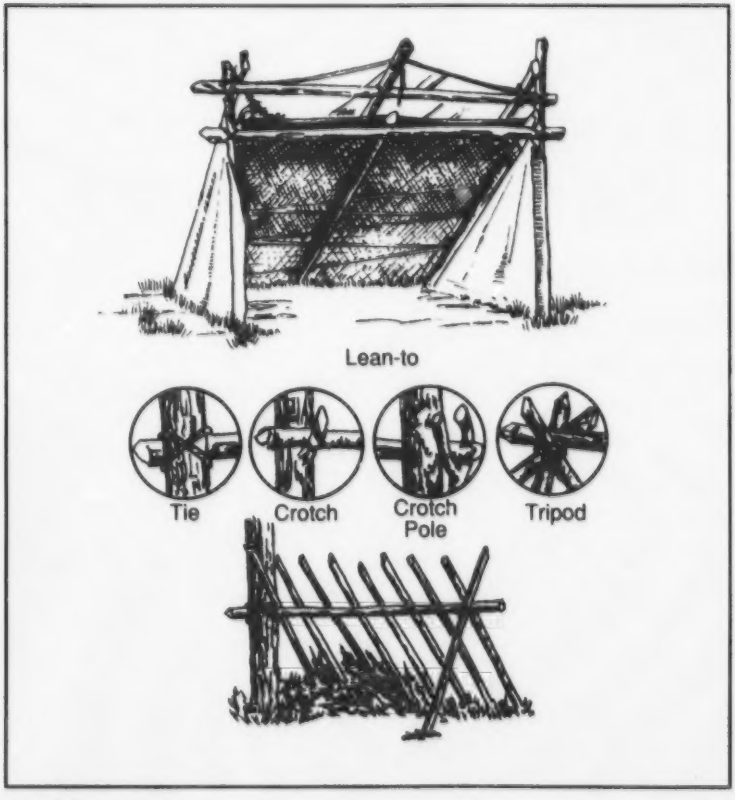


Figure 8.6

Wigwam

Primarily used in wooded areas, the wigwam is constructed around three upright poles about 3 metres long forming a tripod. Wrap plastic around the poles or heap boughs on the poles until a sturdy covering is made. One of the advantages of the wigwam is that a small fire can be made in the middle of the floor, spreading even heat and keeping the flies out.

Snow-cave

Used primarily in treeless terrain, the snow-cave makes use of a large, solid snow drift or overhang to form a tunnel with a small cavern inside. Use your snowshoe as a shovel and dig a tunnel about one meter long into the bank, just wide enough to crawl through. Dig away at the end of the tunnel under the bank until you have enlarged an area comfortable for you. Poke a small air hole from the inside out. Line with coniferous boughs where possible.

Building a Fire

Without a fire, you will have a hard time meeting the requirements of warmth, food and drinkable water. But a fire in the woods is a serious responsibility. Even the smallest fire, set in the wrong location or under poor conditions, can set the bush ablaze. Where possible, try to build a fire at the water's edge. You'll need tinder and a spark. Once you have that in place, you can strike a flame by using:

- matches. They should be carried at all times and be of the "strike anywhere" variety;
- a cigarette lighter. It's a good idea to attach one to your belt before beginning the traverse;
- flint and steel, which are one of the safest and most reliable of fire starters. A few sparks aimed at a small amount of dry, fine tinder will get a fire going;
- the battery of your car, snowmobile, airplane etc. to produce an electric spark. Caution - don't do it near a fuel supply;
- a magnifying glass to focus the sun's rays on a small amount of good tinder. The lens from a camera or binoculars will also do.

Always keep plenty of dry wood and kindling on hand. To build a heat reflector, stack some logs at the back of the fire. To keep your fire going overnight, put some green logs over top of it. The logs will burn slowly as they continue to dry.

Water

You can go without food for an extended period of time, but you can't go without water for more than two or three days. Fortunately, in Ontario a source of water is usually not too far away. The average body uses two or three litres of water per day, so if water is easily accessible, do not ration it.

During the summer, fast-moving water or spring water is preferable, but Ontario's remote lake water is certainly safe. Water from marshy ground or muskeg should be boiled for several minutes or treated with water decontamination tablets. Water from moist earth can be obtained by digging in the mud until water seeps in and settles.

In the winter, open water is also preferred, but melted snow or ice may be substituted. Ice yields the most amount of water for the amount of fuel used. Fluffy snow produces the least. Pack the snow and mix it with the water as it melts. Avoid eating snow as it causes hypothermia by lowering the body's core temperature.

Food

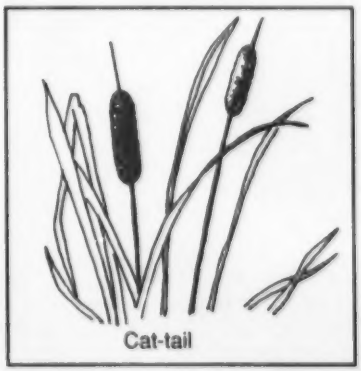
Before digging into your emergency rations survival kit, attempt to locate any easily obtainable natural food. If properly equipped, you might have the opportunity to catch fish with your hooks and line, or snare rabbits and squirrels with the snare wire you've packed. Most healthy adults, with plenty of water and rest, can go about three weeks without food. But remember that stress can rob the body of important vitamins and minerals. Some general rules when foraging are:

- when short on water, eat as many carbohydrates (which contain starch and sugar) as possible. They also require less energy to digest than protein;
- all fur-bearing animals are edible;
- all grass seeds are edible;

- there is more food value in the roots of plants than in "greens";
- all birds and their eggs are edible. Most of the fat is contained in the skin and this is one time you don't need to worry about cholesterol;
- skin frogs, snakes and lizards before cooking or boiling;
- grubs and insect larvae are edible;
- the inside bark of many trees is edible. When scraped from the trunk of birch or poplar trees, the inner bark can be eaten fresh, dried or cooked;
- most black berries and blue berries are edible. Avoid red and white berries, and anything resembling a cucumber or parsnip because some are poisonous;
- all seaweeds are edible;
- avoid mushrooms unless you are absolutely sure that they are not poisonous. There is little nutrition in mushrooms, so it's usually not worth the risk;
- boiling food kills most bacteria while retaining the juices.

Cat-tail

The inner lower foot of cat-tail stalk is best when boiled, but can be eaten raw. Peeled and mashed roots can be boiled until the starch forms a cloud on the top of the water. Leave the mixture overnight scoop out the thick dough-like substance. It can be used for roasting, baking or boiling.


Cat-tail

Bearberry

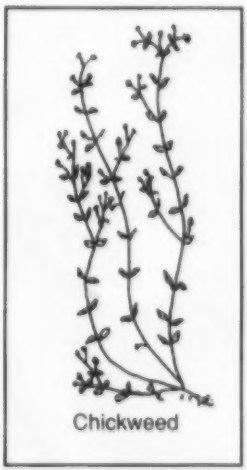
These orange-to-red berries are found in dense, low mats of evergreen leaves which are thick and shiny dark green on top. They can be eaten raw, or cooked in a stew.

Burreed

These are found in the same places as cat-tails, and look similar. The seed head is round and burred, and grows on the side of the stalk. The bulb-like stem and roots can be used the same way as cat-tails.

Burreed

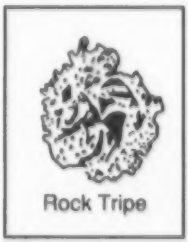
Chickweed


Chickweed

The leaves of this low and brittle plant are oval, smooth and sharply pointed. The plant also has white flowers on the ends of its branch. The leaves can be eaten raw or cooked.

Rock Tripe

This is a leathery lichen with a rubber-like feel found on rocks and it is best used as a thickener for soups or stews. Rinse first.


Rock Tripe

Juniper Berries

The fruit of this evergreen shrub is fleshy and dark blue. Other than flavouring gin, this berry is best used when ground up in a mush of other edibles.

Skunkbush Sumach

This plant grows about two metres tall and has a distinctive, unpleasant odour. The fruit is a dry orange-red berry which can be eaten any way. One advantage of this berry is that it can be wrapped in a cloth and boiled to provide a beverage.

Wappato Arrowhead

This water plant can be easily identified by its long stalk which narrows to a fine point. When pulled out of the ground, the roots can be scraped and substituted for potatoes.

Watercress

This is a leafy, aquatic plant identified by the green oval leaves divided into three to nine segments. It has white flower petals. It is best eaten raw, but adds a unique flavour when cooked with other greens.

Dandelion

Normally found in fields, the dandelion has large toothed leaves at the ground level and a round, bright yellow flower at the very top. The root can be boiled like carrot or roasted to make a coffee substitute. In the spring, the young greens are also edible, either raw or boiled.

Maple

During the fall, the green leaves of the maple turn shades of red and yellow. At the same time, the seeds sprout a wing-like pod and flutter to the ground. These can be eaten raw or roasted. In the spring, the maple tree can be used for its nutritious sap which can be obtained by cutting a hole in the tree.

Pine

The needles of this conifer can be crushed, chopped or used to make tea. The needles are rich in vitamin A, and supply five times as much vitamin C as an equal amount of lemons.

Hunting and Fishing

You should not stray too far from your shelter in search of food as it consumes energy. But have a look around the immediate vicinity. General hunting techniques include walking softly, stopping frequently and watching carefully for rabbit runs, dens, holes, droppings, tracks and feeding grounds.

Snares

These are used primarily for rabbits and squirrels, although they may work with larger game. Rabbit runways are usually found in thickets. The snare is attached to a horizontal pole about 30 cm above the runway with the noose hanging down to a spot just above ground level. It can be left and checked periodically. (See Figure 8.7.)

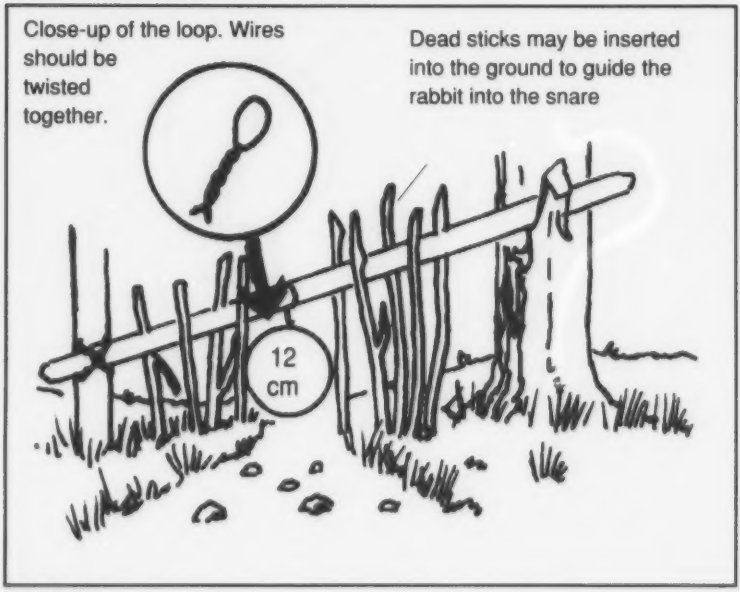

Close-up of the loop. Wires should be twisted together.
Dead sticks may be inserted into the ground to guide the rabbit into the snare
12 cm

Figure 8.7

Squirrel snares are a little more complicated and require the use of several small snares on a pole leaning toward the animal's cache. (See Figure 8.8.)

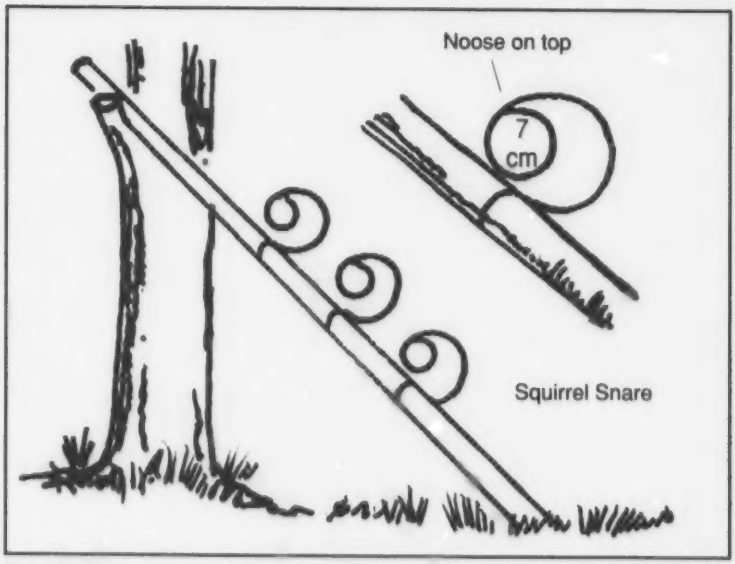


Figure 8.8

Porcupines

If there's a porcupine in the neighbourhood, you will be able to tell by signs of gnawing at the base of some trees. The porcupine is a slow-moving animal which can be easily killed with a club or spear. When skinning, start from the belly and slowly peel the skin back, watching the quills.

Upland Game Birds

These are difficult to kill without a firearm, but the spruce partridge can sometimes be taken by extending a pole with a wire loop around the end and dropping it over their head like a noose.

9.0 Injuries and First aid

An injury in the field usually happens in an instant and without warning. The faster an injury receives medical attention, the greater the chance for successful recovery.

First aid is the immediate and temporary care given to the victim of an accident or sudden illness. Its purpose is to save life and reduce the suffering until the services of a physician can be obtained. Every supervisor and crew member in the field should be trained in St. John Ambulance Standard First Aid or its equivalent. Every emergency kit should contain a first aid manual, for which this chapter is no substitute.

9.1 Priorities

First priority for treatment and subsequent transportation should be given to victims with:

- airway obstructions or breathing difficulties;
- severe bleeding;
- unconsciousness;
- other life-threatening emergencies, including severe hypothermia and hyperthermia.

Second priority for treatment are injuries which, while severe, are not immediately life-threatening. These include:

- back or neck injuries;
- fractures;
- burns.

Third priority should be given to less severe injuries which can still benefit from first aid. These types of injuries include:

- minor bleeding;
- minor fractures;
- sickness, frostbite, etc.

9.2 Examination

The secret to providing quality first aid lies foremost in the diagnosis of the problem. Feeling the pulse, looking for blood and

swelling, observing the pallor of the skin and listening to the victim's breathing are all important clues to the nature of the injury.

Proper examination and assessment of an injury is the most important step in preventing physical impairment. Some injuries can result in permanent impairment or even death if not treated immediately.

Where possible, talk to the victim to find out what happened. If the victim is unconscious, look for a medic-alert bracelet or necklace after the primary examination.

Primary Examination - Critical Injuries

The first priority is to determine and treat life-threatening conditions:

Breathing

Check that the victim is breathing. Look for the rise and fall of the chest, then listen close to the victim's mouth and nose for sounds of breathing and to feel for air movement on your cheek.

If the victim is not breathing, open the airway and start artificial respiration immediately. (See page 53.)

Heartbeat

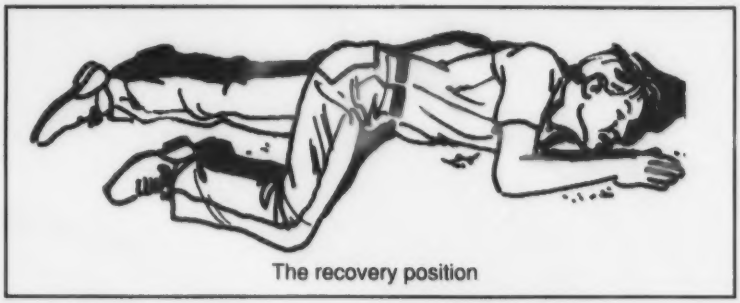
Check the pulse, either at the wrist or, preferably, on the carotid artery in the neck. If no pulse is found, begin cardio-pulmonary resuscitation (CPR) immediately. (See page 55.)

Bleeding

Control severe external bleeding immediately by getting the victim in a resting position, elevating the wound and applying direct pressure to it. (See page 56.)

Unconsciousness

An unconscious victim can develop breathing problems and should not be left alone if possible. Place the victim in the recovery position if injuries permit. (See Figure 9.1.)



The recovery position

Figure 9.1

Secondary Examination - Non-Critical Injuries

The second priority, once the life-threatening injuries have been taken care of, is to determine those injuries which, while not life-threatening, should be stabilized or treated.

Head

- look for blood. If there is blood present, part the hair to determine the extent of the laceration;
- feel for any deformity, but do not move the head up or down;
- check the ears and nose for blood or other fluid which could indicate a fractured skull;
- check the pupils for non-reaction to light. This could indicate a head injury.

Neck

- observe for abnormal positioning of the neck;
- look and feel for any deformity or bony protrusions;
- if there is any reason to suspect neck or spinal injury, immediately stabilize the neck. Be extremely careful and don't move the victim. More damage can be done to a victim through awkward handling than if they are left still.

Spine

- do not move the victim if spinal injuries are suspected;

- paralysis could result from the spinal cord being severed, excess pressure being put on the spinal cord or a fracture of limbs;
- lack of feeling or movement in the extremities could indicate paralysis.

Chest and Shoulders

- check the chest for movement;
- feel for any deformity or tenderness, indicating a possible fracture;
- watch the victim's respiratory rate and note any changes;
- press gently on the rib cage to check for any rib fractures;
- feel each collarbone and shoulder for fractures or bleeding.

Abdomen

- feel the abdomen for spasms and tenderness;
- a bloated and hard abdomen could indicate internal bleeding or a rupture;
- look for other bruising or cuts.

Pelvis

- check for fractures around the hip bone. If the leg has an out-turned "roll" then it is likely that the femur is broken;
- check for urine around the pubic area.

Arms and Legs

- check for protruding bones and extremities in unnatural positions;
- look for swelling, lumps or tenderness;
- lack of mobility is a good indicator of a fracture.

9.3 Treatment

Artificial Respiration

Also called "mouth-to-mouth resuscitation", one of the major advantages of this technique is that it can be done anywhere, by almost anyone, and provides maximum ventilation.

Tilt the victim's head back to open the airway, pinch the nostrils, then open the victim's mouth. Place your own mouth over the victim's and give two quick breaths, allowing the chest to deflate in between. (See Figure 9.2.)

Tilt the head and pinch the nostrils.

Make a tight seal

Watch for rise and fall of chest

Figure 9.2

If the chest does not rise, check that the head is correctly tilted to open the airway and that there are no obstructions in the mouth or throat.

Blow steadily every five seconds. Never give up. Continue artificial respiration until either the victim starts to breath on their own, or until medical aid arrives.

Cardio-Pulmonary Resuscitation (CPR)

CPR should only be performed by fully trained certified personnel.

The first two hours after a cardiac arrest (heart attack) will often determine whether a victim lives or dies. CPR has been developed as an interim life support system until professional medical help is administered.

There are two basic parts: the first is to be able to recognize the signs of arrested breathing and circulation; the second is to effectively administer CPR until either the victim recovers on his own or other help arrives. The first part is done by:

- placing an unconscious victim on a flat surface;
- taking several seconds to determine if the victim is breathing;
- if not, immediately starting artificial respiration (see page 53);
- checking the victim's pulse by placing your fingers just down from the Adam's apple in the groove at the intersection of the throat and voice box. (See Figure 9.3.)

Carotid pulse.

Figure 9.3

If there is no pulse, proceed to the second part by:

- placing the heel of your hand directly on the victim's chest, about 5 cm (2 inches) above the bottom edge of the breast bone;
- placing your weight directly above the chest so your arm is straight and rigid;
- lowering your weight until the chest is depressed about 5 cm (2 inches);
- repeating this movement 15 times, at a rate of almost 2 per second, then giving 2 breaths of artificial respiration, continuing the 15 chest compressions to every 2 breaths;
- repeating this procedure until heart action starts or until medical help arrives.

Bleeding

Logic dictates the first rule of treating any scrape, cut or puncture is to stop the bleeding. You do this by applying direct pressure to the wound, elevating the wound, and getting the victim into a position of rest. Resting will slow the heart rate and cause less blood to be pumped to the wound.

Most wounds which occur in the wilderness are quite dirty and should be cleansed and disinfected. Using a clean cloth and rubbing alcohol, do the following:

- cleanse the area with the alcohol;
- cleanse the area around the wound without touching it with your fingers;
- affix the dressing with tape or bandages.

Bleeding can also be slowed by applying pressure to the main arteries between the cut and the heart. However, a tourniquet should only be used as a last resort when all other methods to control the bleeding have failed. A tourniquet can be improvised by placing a strip of cloth or a belt above the wound and around the artery which controls the blood flow. Then tie a half-knot and insert a stick through the half-knot. Finish by tying the knot and twisting the stick until the bleeding stops. The tourniquet should be loosened every hour to determine if the bleeding has stopped. If the bleeding has stopped, leave the tourniquet loosened, but in place.

Shock

Shock is a depression of the body's reaction to an injury through circulatory failure. In effect, it deadens the pain by dulling the senses. It can occur with even minor injuries and can be fatal if left untreated. Symptoms include bluing of the lips or fingertips, a weak and rapid pulse, shallow breathing and changes in the level of consciousness. Cold, bleeding and pain can intensify shock.

To prevent and control shock:

- treat the obvious causes, such as severe bleeding, burns or fractures;
- when possible, place a conscious victim on their back, with the head and chest area lower than the rest of the body. This helps the blood flow more easily to the heart, lungs and brain;
- place an unconscious victim in the recovery position (i.e. on their side) in case they vomit or bleed internally;
- loosen clothing around the neck, chest and waist;
- keep the patient warm and sheltered;
- reassure a conscious victim.

Fractures and Sprains

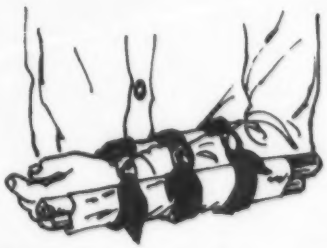
There are two types of fractures: fractures in which the bone breaks but the skin is intact; and fractures where the bone protrudes from the skin.

Signs and symptoms of a fracture include pain and tenderness at the fracture site, inability to move the limb, pain upon movement and swelling or deformity.

Fractures (or suspected ones) should be immobilized with splints, which stabilize the break and keep the bone ends from rubbing on each other. Treat as follows:

- using tree branches, boards, ski poles etc., make a splint which extends past the joint above and below the fracture;
- make sure the limb is as close to its natural position as possible before the splint is fastened;

- put a pad between the splint and the limb;
- using ropes, bandages, strips of cloth, belts etc., wrap around the splint until it is tight but not painful to the victim. (See Figure 9.4.)



Sticks rolled in cloth to form an improvised splint for the forearm

Gently place broken leg into line with the other. Pad well and immobilize by bandaging to the unbroken leg or to a well-padded splint reaching from the foot almost to the armpit.

Figure 9.4

Dislocations occur when the ligaments around a joint are stretched or torn, causing the bones to come out of position. The most common dislocation is that of the shoulder. To lessen some of the pain, immobilize the joint in a position of comfort and apply an ice pack. The joint should be reset by a physician.

Sprains, which occur when ligaments are torn or stretched, usually result in a great deal of swelling. First aid involves applying ice, gently compressing the swollen area with bandages and elevating the limb. A splint may be used until a fracture has been ruled out. By staying off the limb, the sprain will usually heal by itself and not require any subsequent medical treatment.

Burns

The usual minor burns from a hot pot or boiling water can usually be treated by:

- immediately immersing the burn in cold water to relieve the pain and reduce swelling;
- removing any restrictive clothing or jewelry before swelling starts;
- covering the burn with a clean sterile dressing. A clean cloth will do. Otherwise, leave the burn uncovered.

Do not apply antiseptic, oil, iodine or butter to the burn. Don't break any blister: it's nature's way of fighting infection. Don't breath on or touch the burn. Don't remove any clothing that is stuck to the wound.

Frostbite

Frostbite - a freezing of the tissues - usually affects the fingers, toes and face. The symptoms include white skin which is firm to the touch. As frostbite progresses the skin will become waxy and hard.

Mild frostbite can be treated by gradually rewarming the area. This can be done by putting frostbitten fingers in your armpits or putting a warm glove over a cold nose. Don't rub snow on frostbite.

In its most severe form, some tissues become deadened beyond recovery and some of the affected tissue has to be removed.

Usually, frostbite can be avoided by taking the proper precautions and having the right clothes and equipment handy.

Blisters

Blisters can occur on the feet when socks rub against skin because boots are too large or are improperly laced. A slight sensation in the same place every time a step is taken is a good indication of a potential blister.

Take off your boots and socks and apply a large strip of gauze or tape over the reddened area. If the rubbing is caused by boots which are too loose, put on another pair of socks. Because of the risk of infection, don't break blisters.

Hypothermia

Also known as exposure sickness, hypothermia can develop quickly and prove fatal. It occurs when the inner temperature of the body falls to a level where the internal organs cease functioning.

It is usually caused by cold, wet, chilling weather combined with hard physical effort which can lead to exhaustion. It results in the body losing heat faster than it can produce it.

The most noticeable symptoms are:

- violent shivering which stops as the victim progresses into severe hypothermia;
- bluing of the lips and finger tips;
- slurred speech or irrational behaviour;
- weak, slow pulse;
- in its final phases, unconsciousness and death, as the heart and lung control centres of the brain cease functioning.

To avoid hypothermia, dress appropriately with wool clothing and an outer waterproof layer. Also, rest frequently and carry matches and high-energy foods. Most importantly, be on the lookout for symptoms and recognize the weather conditions where people are most susceptible to the condition.

Should you encounter someone suffering from hypothermia, do the following:

- get the victim out of the elements;
- if possible, get the victim out of their wet clothes and into a sleeping bag near a source of heat, or apply body heat;
- give the conscious victim warm drinks with no alcohol (alcohol contributes to the body's heat loss);

- always handle the casualty gently, don't rub them or make them do vigourous exercise.

Hyperthermia

There are three main forms of hyperthermia or heat stress: heat cramps; heat exhaustion (headache, dizziness, weakness, nausea); and heat stroke (disorientation, delirium, convulsions). Heat cramps and heat exhaustion result from dehydration and salt depletion as your body sweats to lower its internal temperature. Heat stroke occurs when body temperature exceeds 41 degrees celsius (105°F) and can cause death without immediate medical attention.

There are several ways to reduce heat stress:

- drink plenty of fluids. Do not rely on thirst to tell you when or how much to drink. Drink large quantities before you begin to work and about one cup every 20 minutes while you work. Do not drink milk, undiluted fruit juices or any form of alcohol, which actually causes your body to lose fluids;
- increase your salt intake slightly. The salt in most prepared foods should be sufficient, but if you have been sweating heavily a moderately saline drink such as "Gatorade" might be in order. Salt tablets should only be taken on the advice of a doctor;
- wear light-coloured, loose-fitting clothing that does not leave too much skin exposed. Wear a hat in the sun;
- most importantly, listen to your body. Don't over-exert yourself in hot weather, on or off the job.

The treatment for hyperthermia is just the opposite of hypothermia: get the victim out of the sun into as cool a location as possible; loosen their clothing; and cool the victim as quickly as possible with ice or cold water, paying particular attention to the head, armpits and groin.

Diarrhea

In addition to being uncomfortable, diarrhea can rob the body of nutrients and fluids. The best way to prevent it is by decontaminating drinking water by either boiling it for 5 minutes or

by adding disinfectant pills to it. Make sure your cooking and eating utensils are clean and avoid overeating.

See also the sections on Giardia and Tularemia below.

Giardia

Giardia, or "beaver fever", is a common parasite which enters the human digestive system as a cyst and subsequently releases a parasite that attaches itself to the wall of the intestine.

Giardia is picked up by direct contact with animal or human feces, or from drinking water contaminated by feces. The symptoms, which may take a week or more to show up, include severe diarrhea, cramps, nausea and vomiting. You may also experience headaches, fatigue, chills and severe gas. Many cases of "traveller's diarrhea" or "Montezuma's revenge" turn out to be giardia.

Get medical attention at the first opportunity, and in the meantime, treat the symptoms. Although the parasites may disappear on their own, an untreated case can become chronic and go on for a year or more. Precautions include:

- ensuring that you boil, for at least 5 minutes, all natural waters used for drinking or other household purposes;
- making sure that you wash your hands thoroughly after using the toilet;
- never swimming in a beaver pond.

Tularemia

This disease is caused by bacteria transmitted to humans through:

- drinking water or ice that has been contaminated by the feces of infected animals;
- direct contact with fur, internal organs, body fluids or discharges of infected animals. Usually, the bacteria enter through a scratch on the skin;
- eating meat that has not been cooked long enough to kill the bacteria.

Symptoms resemble the flu, including fever, chills, headaches, sweating, nausea, diarrhea and general malaise. As with giardia, treat the symptoms until medical help is available.

The best ways of protecting yourself from tularemia are boiling all water for 5 minutes and wearing rubber or surgical gloves when handling any wild animal or bird. Wash your hands and all the tools carefully and cook any game thoroughly. Boiling has been suggested as the best method of cooking.

Insect Bites

At certain times of the year, insect bites can be more than just a nuisance, particularly in a survival situation where the lost person has enough difficulty remaining calm. The only way to avoid getting "eaten alive" is to prevent it by using repellents and by covering exposed areas. Some helpful hints are:

- avoid perfumes and deodorants as they actually attract black flies and mosquitoes;
- fasten your collar and your shirt cuffs around your wrists, and tuck your pants inside your boots. Loose fitting clothing is the best;
- if you don't wash, the build-up of natural body oil seems to deter insects;
- sit close to the camp fire because the smoke keeps insects away;
- try to walk and camp in open areas where there is a stiff breeze;
- antiseptic or a layer of mud will help reduce the itching.

Ticks and Lyme Disease (LD)

If left untreated, this infectious disease can cause severe arthritis, neurological or heart problems, or both. It is transmitted to humans by the bite of infected deer ticks.

Deer tick
Figure 9.5

The greatest risk of becoming infected occurs while walking barelegged through brush or tall grass. To minimize this risk:

- wear long, tucked-in pants and sleeves and proper footwear;

- apply insect repellents containing "D.E.E.T." to deter the ticks from biting;
- conduct daily checks on clothing and body for any attached ticks or the characteristic bull's-eye rash that appears at the site of the bite. Ticks prefer the groin and head, especially the base of the neck and behind the ears. If you find one tick, there may be more. Recheck thoroughly.

Transmission of the bacteria requires approximately 24 hours of attachment, so prompt removal is important:

- do not "twist" or jerk the tick, as mouth parts may break off in the wound, causing infection;
- apply the hot tip of a cigarette or match to the tick's body, causing the tick to back away from the bite site;
- another method is the application of a drop of gasoline, acetone or turpentine at the back of the tick's head, followed by slow, gentle traction with a pair of tweezers. Grasp the tick as close as possible to the mouth parts, and pull gently over a 1 to 2 minute period;
- cleanse the area thoroughly and apply a mild antiseptic.

Poison Ivy

This infamous plant is so adaptable you aren't even safe in your own garden. While its three-leaf stalk is said to be distinctive, it looks like numerous other plants.

Its most harmful effect comes from a distressing toxic action on the skin of people who come in contact with it. When the leaf of the plant is torn it releases an oil easily transferred to clothing, shoelaces, handles of baskets or coolers, anything. Ultimately, it comes into contact with the skin.

Figure 9.6

One of the most pronounced symptoms is a reddish, itchy rash accompanied by small water blisters. Because the rash will run its course, the primary goal is to relieve the itching.

Avoid the use of greasy ointments. Instead, dissolve a tablet of potassium permanganate in a liter of water and apply freely. Bathing in Epsom salt also alleviates some of the itch.

10.0 Additional Sources of Information

Under the *Workers' Compensation Act*, all prospectors in Ontario are members of Class 5, and hence entitled to the services of the Mines Accident Prevention Association of Ontario, which provides information and training on occupational health and safety. Prospectors may find out more about the services available by contacting the Area Representative responsible for prospectors at:

MAPAO
Box 1468
147 McIntyre Street West
North Bay, ON
P1B 8K6
Tel. (705) 472-4140
Fax (705) 472-5800

The following are useful sources of additional information.

General

Safety Manual: Mineral Exploration in Western Canada, by the British Columbia and Yukon Chamber of Mines. An excellent booklet covering safety, equipment, survival, camp management and transportation.

Driving

How to Survive, by Ontario Ministry of Natural Resources. This booklet gives information about winter driving and equipment.

Gravel and Bush Road Driving: A Defensive Approach, by Ontario Ministry of Natural Resources. An excellent video and booklet.

First Aid

St. John Ambulance Standard First Aid Manual. The most comprehensive first aid manual. A must-have in any field camp.

Wilderness Emergency Care, by Bob and Deborah Donaghy, published by Humber College Press. A helpful first aid book directed at injuries in the field.

Survival

Down But Not Out, by the RCAF Survival Training School Staff, published by Canadian Government Publishing Centre. An excellent comprehensive survival guide.

Surviving the Manitoba Wilderness, by Manitoba Natural Resources. A handy pocketbook covering bush survival and basic first aid.

Wilderness Survival, by Tim Kneeland, available from the Mines Accident Prevention Association of Ontario. A good, inexpensive pocketbook on basic survival equipment and skills which fits easily inside an emergency survival kit.

Wilderness Survival, by the Province of British Columbia. A complete handbook covering provisioning, survival and first aid.